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Original Article

The Incidence of Delirium at the Postoperative Intensive Care Unit in Adult Patients

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Abstract

Objective: In this study, we aimed to determine the risk factors and the incidence of delirium in patients who were followed postoperatively in our surgical intensive care unit for 24 h using the confusion assessment method (CAM).

Methods: After obtaining approval from the ethics committee, 250 patients were included in the study. Patients who were operated under general anaesthesia or regional anaesthesia and followed in the surgical intensive care unit were evaluated by the Ramsay Sedation Scale on the first postoperative day. CAM was applied to the patients who had a Ramsey Sedation Score of ≤4. Patients' age, gender, American Society of Anesthesiologists (ASA) scores, preoperative risk factors, type of anaesthesia, operation time, intraoperative procedures, pain scores evaluated by the visual analogue scale (VAS) and postoperative analgesia methods were recorded.

Results: The incidence of delirium was found to be 18.4%. The average age of patients who developed delirium was greater than the others (68.8±12.7 and 57.6±12, p=0.001, respectively). It was observed that a one-unit increase in the ASA score resulted in a 3.3-fold increase in the risk of delirium. The incidence of delirium in patients undergoing regional anaesthesia was 34.6%, whereas it was 16.5% in patients receiving general anaesthesia (p=0.024). The existence of preoperative diabetes mellitus (DM) and chronic obstructive pulmonary disease (COPD) was shown to improve the development of delirium (p<0.05). Delirium incidence was significantly higher in patients who were administered meperidine for postoperative analgesia (p=0.013). The VAS scores of patients who developed delirium were found to be significantly higher (p=0.006).

Conclusion: As a result, we found that older age, high ASA score, preoperative DM and COPD are important risk factors for the development of delirium. Regional anaesthesia, high postoperative pain scores and meperidine use were observed to be associated with the development of delirium. In the postoperative period, addition of CAM, a simple measurement technique, to the daily follow-up forms can provide the early recognition of delirium, which is often underdiagnosed. We think that identification and prevention of effective risk factors have the primary importance for postoperative delirium.

Keywords: Delirium, postoperative delirium, intensive care, surgery

Introduction

Delirium, the most known form of cognitive disorder, is an acute confusion state characterized by loss of orientation and impairment of attention and memory and changes throughout the day (1). Delirium is a state that causes severe results and as has been indicated by study findings, increases mortality and morbidity rates and hospitalization duration (2, 3). Many factors such as male gender, a drinking habit, dehydration, multiple drug use, pain, neuroleptic and narcotic drug use may cause delirium. In the case of serious disease, having cognitive disorder at the beginning and an advanced age are the most important factors leading to an increased incidence (4-7).

Although the prevalence and significance of delirium have been shown by a large number of studies, it is stated that its diagnosis is not sufficiently made and that 64–84% of patients are unnoticed and 33–66% of them cannot be diagnosed (10, 11). Some tests and scales are used for the assessment of delirium, with the confusion assessment scale (CAS, CAM-ICU) being among the most commonly preferred scale for delirium diagnosis for intensive care. A validity and reliability study of the scale developed by Ely et al. (10) in 2001 in Turkish was conducted by Akıncı and Şahin (11) in 2005.

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In this study, we planned to detect the postoperative delirium incidence of patients followed over 24 h in a postoperative surgical intensive care unit using the CAS and to determine the risk factors in our clinics. Moreover, we aimed to contribute to the early diagnosis and treatment of delirium by increasing the clinical practice of CAS.

Methods

The present study was performed with 250 patients, whose written informed consents were received after ethics committee approval (02.04.2014, no: 2014-3/87) of Dr. Abdurrahman Yurtaslan Ankara Oncology Education and Research Hospital. Patients who refused to be included in the study and requested to be withdrawn from the study, together with those who had known dementia, Parkinson, Alzheimer or psychiatric diseases; who were illiterate; who had speaking, seeing and hearing problems; who were alcohol abusers; who underwent intracranial interventions; who were taken under an operation in emergency situations; who required mechanical ventilation support or who were below the age of 18 years were excluded from the study. The research was conducted as a prospective and observational study, and no intervention was conducted regarding intraoperative and postoperative follow-ups, analgesia methods for the patients and treatments related with their diseases. Any required postoperative follow-ups and treatments were conducted by the postoperative surgical intensive care unit physician.

Patients for whom an operation was planned with general and regional anaesthesia in the surgical clinics of our hospital and those who were expected to stay for more than 24 h in the postoperative surgical intensive care unit were preoperatively evaluated, and their age, gender, American Society of Anaesthesiologists (ASA) scores and preoperative risk factors were recorded. The patients included in the study were assessed with the Ramsay sedation scale (Table 1) on the postoperative first day, and CAS was applied to the patients whose score was 4 or below. The patients who required postoperative mechanical ventilation support after the development of postoperative heart or respiratory failure [chronic obstructive pulmonary disease (COPD), heart failure, pulmonary embolism, etc.] due to surgical and medical reasons and who had sedation scores of 5 or 6 were excluded.

CAS is composed of four parts. In the first part, sudden changes in consciousness and consciousness fluctuation are tested. In the second part, in the test for the evaluation of attention, squeezing the hand for the letter A less than 12 times tests for consciousness fluctuation and impaired attention, which are two of the most important signs of delirium. In the third part, whether or not thought organization is disturbed is evaluated by asking four questions, which also tests whether or not a simple instruction can be followed. The fourth part is related with the evaluation of the level of consciousness. The first two parts and the third or fourth part must be in favour of a delirium diagnosis to make the actual diagnosis of delirium.

Table 1. Ramsay sedation scale

Score	Clinical picture
1	Awake, nervous, anxious and agitated patient
2	Awake, cooperative, oriented and calm patient
3	Patient just replying to the orders
4	Sleeping, responding fast when hit in the glabella
5	Sleeping, responding slowly to the stimuli
6	Patient responseless to the painful stimulus

The patients' modified Aldrete scores, premedication applied and anaesthesia form, intervention duration, intraoperative procedures, intravenous infusions used in the intraoperative period, blood transfusions, analgesics used, postoperative analgesia methods and postoperative pain scores [visual analogue scale, (VAS)] were recorded from the anaesthesia follow-up and postoperative patient follow-up forms. Haemogram, electrolyte, kidney and liver function tests of the postoperative patients were recorded. Standard postoperative care and monitoring were applied to all patients.

Considering the delirium incidences in previously conducted studies, it was calculated that the delirium incidence would be 15–25% with a 95% probability when studying 246 patients with a 95% confidence interval (α=0.05) and d=0.05 deviation. In total, 250 patients were included in the study, after discounting all who had to leave the study and be excluded.

Statistical analysis

The IBM SPSS Statistics 21.0 (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp., USA) program was used for statistical analyses and calculations. The data was presented as mean±standard deviation, median (25–75%), (min–max) and n (%). The statistical significance level was accepted as $p<0.05$. The percentage chi-square test, Fischer's exact chi-square test, T test, Mann–Whitney U test and logistic regression analysis tests were used.

For dependent variables of the state of delirium (yes, no), age, gender, ASA score, cardiac disease state and similar independent variables, a logistic regression model for each specified variable was established by the entered method. Furthermore, 95% confidence intervals were determined for the odds ratio (OR) value obtained by the logistic regression.

Results

Delirium incidence was found to be 18.4% in the study patients. 10 of the patients preoperatively examined were not conducted with CAS. The modified Aldrete score recorded when the patients were transferred to postoperative intensive care unit was found to be 8.4±0.6 in the patients applied general anaesthesia and was found to be 8.9±0.2 (p>0.05) in the patients with regional anaesthesia. The Ramsay sedation scores were similar in patients developing delirium or not developing delirium (2(1-3), p>0.05).

The duration of the operations were longer in patients developing delirium (p=0.03). The general mean age was 59.7±13.3 and the mean age in the patients developing delirium was higher (p=0.001, Table 2). A higher rate of delirium (34.6%) was detected in the patients applied regional anaesthesia (p=0.024), while the mean age of the patients applied regional anaesthesia was 70.4±15.2. The mean age of the patients applied general anaesthesia was 58.4±12.5 (p=0.001). The ASA IV number of patients was significantly higher in patients applied regional anaesthesia (regional anaesthesia 30.8% and general anaesthesia 5.4%, p=0.001). The number of patients over the age of 65 was 88 and the number of patients under the age of 65 was 162, and it was detected that the delirium incidence in patients over the age of 65 was significantly higher (p=0.001). The delirium incidence according to age, gender, ASA scores, duration of intervention and anaesthesia method is displayed in Table 2.

When the preoperative risk factors are examined, while there was no difference with regard to delirium development between patients with a history of heart disease and hypertension and patients without a history of heart disease and hypertension, it was detected that the presence of COPD increased delirium development (p=0.004, p=0.03, respectively) (Table 3). 177 of the patients were those where an intervention had been carried out due to malign disease. It was found that a malignancy presence did not increase delirium incidence (p=0.383).

It was seen that intravenous (IV) midazolam was performed on all patients for premedication. Delirium incidence in these patients was found to be 15.8%, while it was found to be 25.8% in patients who had not received premedication (p=0.072).

Delirium incidence in blood transfusion, remifentanil infusion and postoperative patient-controlled analgesia (PCA) is displayed in Table 4. It was detected in our study that performing an intraoperative blood transfusion and intraoperative remifentanil infusion did not increase postoperative delirium incidence. It was seen that tramadole HCL was used for IV PCA and bupivacaine was used for epidural PCA. It was detected that epidural and IV PCA methods did not increase delirium development.

A significant difference was not found when comparing the delirium incidence in patients who had an intraoperative invasive intervention conducted and the delirium incidence in patients who had not had an invasive intervention conducted (Table 5). While delirium was found at the rate of 18.7% in patients who had an invasive intervention conducted, it was 11.1% in the patients who had not had an invasive intervention conducted.

Table 2. Demographic data, operation duration and delirium incidence according to the anaesthesia method, n (%), mean±SD

	CAS (+) (n=46)	**CAS (-) (n=204)**
Age (years)	68.8±12.7*	57.6±12
-Over the age of 65	29 (33%)*	59 (67%)
-Below the age of 65	17 (10.5%)	145 (89.5%)
Gender (F/M)	25/21	83/121
ASA (I/II/III/IV)	0/10/26/10	4/107/83/10
Duration of operation (min)	251.6±149.4**	189.2±89.7
General anaesthesia	37 (16.5%)	187 (83.5%)
Regional anaesthesia	9 (34.6%)*	17 (65.4%)

*p<0.05 when the rates of patients at whom developed delirium compared, Chi-square test and T test were used in the comparison of data.
**when delirium developed and not developed patients are compared, n: number of patients.
SD: standard deviation; F: female; M: male; ASA: American Society of Anaesthesiologists; CAS: Confusion Assessment Scale

Table 3. Preoperative risk factors

		CAS (+) (n=46)	**CAS (-) (n=204)**	**p**
Heart disease	Yes	11 (17.5%)	52 (82.5%)	0.824
	None	35 (18.7%)	152 (81.3%)	
HT	Yes	20 (24.1%)	63 (75.9%)	0.101
	None	26 (15.6%)	141 (84.4%)	
DM	Yes	17 (32.1%)	36 (67.9%)	0.004
	None	29 (14.7%)	168 (85.3%)	
COPD	Yes	12 (30.8%)	27 (69.2%)	0.03
	None	34 (16.1%)	177 (83.9%)	

HT: hypertension; DM: diabetes mellitus; COPD: chronic obstructive pulmonary disease CAS: Confusion Assessment Scale; n=number of patients. Chi-square test was used in the comparison of data.

The effects of other analgesics apart from postoperative PCA on delirium incidence are given in Table 6. It was observed that delirium incidence was higher in the patients using meperidine and a meperidine+NSAI combination for postoperative analgesia (p=0.013). The effect of the analgesics used was found to be significant when the effect of other variables was removed (Wald statistic=16.581; p=0.001). The inclination of delirium occurrence was 8.980 (95% GA: 1.194; 67.547) times more in the patients using meperidine than the patients not using any analgesics and it was 11.608 (95 GA%: 2.598; 51.875) times more in the patients using meperidine+NSAI than in the patients not using any analgesics (Table 7). The VAS value of 1 (0–5) in the patients developing delirium was significantly higher than the VAS value of 0 (0–4) in the patients not developing delirium (p=0.006).

Table 4. Blood transfusion, remifentanil infusion and delirium incidence in postoperative PCA, n (%)

		CAS	
		(+) (n=46)	(-) (n=204)
Blood Transfusion	Yes	12 (22.2%)	42 (77.8%)
	None	34 (17.3%)	162 (82.7%)
Remifentanil Infusion	Yes	18 (21.4%)	66 (78.6%)
	None	28 (16.9%)	138 (83.1%)
PCA Epidural	Yes	6 (19.4%)	25 (80.6%)
	None	40 (18.3%)	179 (81.7%)
PCA IV	Yes	6 (21.4%)	22 (78.6%)
	None	40 (18%)	182 (82%)

IV: intravenous; PCA: patient-controlled analgesia; CAS: Confusion Assessment Scale; n=number of patients.

Table 5. Delirium incidence in patients with an invasive intervention conducted, n (%)

		CAS	
		(+) (n=46)	(-) (n=204)
NC	Yes	22 (21%)	83 (79%)
	None	24 (16.6%)	121 (83.3%)
BT	Yes	45 (19.1%)	190 (80.9%)
	None	1 (6.7%)	14 (93.3%)
CVC	Yes	16 (25%)	48 (75%)
	None	30 (16.1%)	156 (83.9%)
IAM	Yes	30 (20.3%)	118 (79.7%)
	None	16 (15.7%)	86 (84.3%)

CAS: Confusion Assessment Scale; NC naso-gastric catheter; BT: bladder tube; CVC: central venous catheterization; IAM: intra-arterial monitoring; n=number of patients.

It was determined that the age of the patient has a statistically significant effect on delirium (Wald statistics=24.185; p<0.001, Table 8). It was found that a one unit rise in age increased the risk of delirium 1.087 (95% GA: 1.052; 1.124) times. Similarly it was found that ASA scores and the duration of intervention have separate effects on delirium (p<0.05) (Table 8). It was found that a one unit increase in ASA scores increased the risk of delirium 3.335 (95% GA: 1.974; 5.633) times (Wald statistics=20.267; p<0.001, Table 8). It was detected that the gender did not have a significant effect on delirium (Wald statistics=2.816; 0.093, Table 8).

The tendency of having delirium in patients with diabetes was 2.736 (95% GA: 1.360; 5.501) times more than in patients without diabetes (Wald statistics=7.972; p=0.005, Table 8). The tendency of having delirium in patients with COPD was 2.314 (95% GA: 1.068; 5.011) times more than in patients without COPD (Wald statistics=4.527; p=0.033, Table 8). When the delirium development incidence is evaluated according to anaesthesia method, it was detected that the delirium risk was 2.676 times higher in patients applied regional anaesthesia than in patients applied general anaesthesia. When the effects of postoperative analgesia method, premedication, heart disease and hypertension presence, malignancy diagnosis, remifentanil infusion, blood transfusion and invasive interventions on delirium were examined separately, it was detected that they were not statistically significant (p>0.05, Tables 7, 8).

When haemoglobin values, electrolytes, liver and kidney functions were compared, it was seen that blood urea nitrogen (BUN) and creatinine values were significantly higher in patients developing delirium (p<0.05). When the other laboratory values were compared, no significant difference between delirium-developing and not-developing patients was found (Table 9).

Table 6. Analgesic use and delirium, n (%)

		CAS	
		(+) (n=46)	(-) (n=204)
Not used analgesic		13 (17.6%)	61 (82.4%)
NSAI		18 (13.4%)	116 (86.6%)
Meperidine		4 (40%)	6 (60%)
Meperidine+NSAI		11 (34.4%)	21 (65.6%)
PCA Epidural	Yes	6 (19.4%)	25 (80.6%)
	None	40 (18.3%)	179 (81.7%)
PCA IV	Yes	6 (21.4%)	22 (78.6%)
	None	40 (18%)	182 (82%)

CAS: Confusion Assessment Scale; IV: intravenous; PCA: patient-controlled analgesia; NSAI: non-steroidal anti-inflammatory; n=number of patients

Discussion

We found the postoperative delirium incidence to be 18.4% in our study. We detected that advanced age, high ASA score, long intervention duration and the regional anaesthesia method applied can increase delirium incidence.

The prevalence of delirium for all the hospitalized patients in the epidemiological studies was 10–30% and in the postoperative study was 36% (0–73%) (3, 8, 12, 13). The delirium incidence after coronary artery bypass surgery was reported to be 41.7%, and 10.3% after heart surgery (14, 15). In the studies in which delirium was examined in geriatric patients in the surgical ICU, it was detected that delirium developed at the rates of 29.8%, 31% and 81.3% (11, 16). In a study in which 333 patients over the age of 65 and after non-cardiac surgery were evaluated, while postoperative delirium was seen in 46% of the patients, the delirium incidence in the patients

Table 7. Postoperative analgesia methods, blood transfusion and effect of intraoperative interventions on delirium development

				95% Confidence intervals	
	Wald statistics	p	OR	Lower limit	Upper limit
Analgesics used	16.581	0.001			
None/Meperidine	4.546	0.033	8.980	1.194	67.547
None/NSAI	0.067	0.795	0.868	0.299	2.525
None/Meperidin+NSAI	10.302	0.001	11.608	2.598	51.875
Remifentanil Infusion (None/Yes)	0.770	0.380	1.344	0.694	2.603
Blood Transfusion (None/Yes)	0.667	0.414	1.361	0.649	2.855
Epidural PCA (None/Yes)	0.021	0.883	1.074	0.413	2.790
IV PCA (None/Yes)	0.196	0.661	1.241	0.473	3.258
Invasive Interventions (None/Yes)	0.321	0.571	1.837	0.224	15.058
CVC (None/Yes)	2.458	0.117	1.733	0.871	3.447
IAM (None/Yes)	0.841	0.359	1.367	0.701	2.663
NC (None/Yes)	0.782	0.376	1.336	0.703	2.540
BT (None/Yes)	1.308	0.253	3.316	0.425	25.876

PCA: patient-controlled analgesia; CVC: central venous catheterization; IAM: intra-arterial monitoring; NC naso-gastric catheter; BT: bladder tube; OR: odds ratio; NSAI: non-steroidal anti-inflammatory. The relationship of risk factors with delirium development was analysed using logistic regression.

Table 8. Demographic data, anaesthesia method and effect of preoperative risk factors on delirium development

				95% Confidence intervals	
	Wald statistics	p	OR	Lower limit	Upper limit
Age	24.185	<0.001	1.087	1.052	1.124
ASA score	20.267	<0.001	3.335	1.974	5.633
Duration of operation	11.748	0.001	1.005	1.002	1.008
Gender (M/F)	2.816	0.093	1.736	0.912	3.304
Heart disease (None/Yes)	0.050	0.824	0.919	0.435	1.939
Diabetes mellitus (None/Yes)	7.972	0.005	2.736	1.360	5.501
COPD (None/Yes)	4.527	0.033	2.314	1.068	5.011
HT (None/Yes)	2.649	0.104	0.581	0.302	1.117
Premedication (None/Yes)	3.173	0.075	0.539	0.273	1.064
(General/Regional)	4.788	0.029	2.676	1.108	6.461
Malignancy diagnosis (None/Yes)	0.758	0.384	1.389	0.663	2.913

M: male; F: female; ASA: American Society of Anaesthesiologists; COPD: chronic obstructive pulmonary disease; HT: hypertension; OR: odds ratio. The relationship of risk factors with delirium development was analysed using logistic regression.

over the age of 75 after major abdominal surgery was found to be 24% (17, 18). The reasons for giving different incidences in the studies are for the purpose of doing research on different age groups and patient populations and differences in evaluation methods. In many studies conducted on specific patient groups, it has been reported that mechanical ventilation, advanced age, hip and heart surgery all increase delirium incidence. However, there are lots of surgical intensive care patients on whom mechanical ventilation is not applied or those who are not operated on, in addition to these specific surgeries and followed-up in surgical intensive care units. We think that the younger mean age of our patients and the choice of a specific patient and age group has led to us finding a lower incidence of delirium.

Advanced age and associated decreased cognitive function and multiple drug use are the known risk factors for delirium

Table 9. Haemoglobin, kidney/liver enzymes and electrolyte changes.

	CAS (+) (n=46)	CAS (-) (n=204)
Haemoglobin	10.7±1.5	11±1.6
BUN	17.4±9.2*	14.6±11.7
Creatinine	1±0.8*	0.8±0.3
AST	24 (10–493)	24 (2–615)
ALT	15.5 (1–456)	16 (0–598)
GGT	22 (5–215)	20 (6–385)
Sodium	139.1±3.7	138.8±3.7
Potassium	3.8±0.4	3.8±0.6
Calcium	7.5±0.6	7.7±0.7

*when delirium developed and not developed patients are compared. T-test, and Mann–Whitney U test were used in the comparison of data mean±SD, median (min–max). CAS: confusion assessment scale; BUN: blood urea nitrogen; AST: aspartate aminotransferase; ALT: alanine aminotransferase; GGT: gamma-glutamyl transferase

(19-21). The mean age of patients developing delirium was higher than the patients where delirium was not detected. We detected that a one unit increase in age increased the delirium incidence one fold. Peterson et al. (22) found in their study that delirium incidence increased significantly in intensive care patients over 65. In our study, delirium incidence in patients over 65 was also significantly higher (33%). An important result of the increase in age was the rise in coexisting problems; thus cardiopulmonary, renal, infectious and metabolic problems are frequently observed (23). It was reported in the meta-analyses that there was a significant relationship between the increased clinical pictures and delirium (24). It is reported that there has been an increased risk of postoperative delirium in vascular-damage-associated cases, such as hypertension, diabetes mellitus (DM), myocardial ischaemia, atrial fibrillation, peripheral vascular diseases and heart failure (25, 26). Our findings were also supportive of the literature. We detected that the presence of DM and COPD were important risk factors for delirium development and that they increased delirium risk almost 2.5 times. Delirium incidence was also higher in patients with hypertension and malignancy diagnoses, though not statistically significant.

Although it was reported that delirium incidence was higher in male patients and that the male gender was a risk factor in this respect, the delirium rate was similar for both genders in our study (26, 27).

In the study of Zakriya et al. (28), in which they used CAS with 168 patients who had undergone hip fracture surgery, they detected delirium at a rate of 28% (47 patients) in the postoperative period. It was reported in the same study that the prevalence was higher in patients over 80 and who had an ASA physiological classification over II. The fact that the patient group of ASA classification III and IV are patients necessitating more preoperative evaluation and preparation leads to the relative delay of operations and, accordingly, to an increase in their hospitalization duration and thus potential hospital-associated complications. We detected in our study that the ASA score is the most important risk factor affecting delirium development and that a one unit increase in the ASA score increased the delirium incidence risk 3.3 times. Therefore, minor changes in postoperative consciousness levels of the patients with high ASA scores have to be taken into consideration and they have to be closely followed up.

Brauer et al. (29) emphasized that fluid-electrolyte disturbances indicated by laboratory findings, such as abnormal serum sodium and BUN- creatinine rates, are associated with delirium. Björkelund et al. (25) also detected a significant relationship among delirium and high serum potassium, creatinine levels and low haemoglobin concentrations. In our study, it was found that BUN and creatinine levels were high in patients developing delirium and there was no difference with respect to haemoglobin, electrolytes or liver enzymes.

We detected in our study that VAS values were higher in delirium-developing patients and that pain scores were effective on delirium development. Björkelund et al. (25) suggested that effective pain treatment would decrease delirium incidence in patients operated on for hip fractures. Dubois et al. (30) indicated that the use of opioids (morphine and fentanyl) through an intravenous or epidural catheter can be related with delirium development in medical or surgical intensive care patients.

When compared with other opioids, it was reported that a higher rate of postoperative delirium developed with meperidine (19, 31). Marcantonio et al. (32) found that the use of benzodiazepine and meperidine was related to the frequency of the development of delirium. While IV or PCA methods did not increase delirium development, meperidine applied via IV increased delirium development by almost 9 times. This suggests that we need to be careful while using meperidine, an opioid with anticholinergic features, especially in elderly patients, and that we should aim to use other alternatives and methods for postoperative analgesia. We did not evaluate whether analgesics contributed to delirium development or not when used in different ways; however, that the CPA methods provide a more stable blood level compared with IV bolus applications, i.e. by not giving an epidural opioid for analgesia and choosing a poorly effective opioid for IV CPA, may be the key factors affecting this result. Designing guidelines for the management of effective pain treatment may be a preventive alternative against delirium development, especially in the early postoperative period.

Different results were reported about the effect of general and regional anaesthesia on the development of delirium. Parker et al. (33) stated in their study, which was conducted based on the Cochrane database, that general anaesthesia was a risk factor for postoperative delirium. Monk et al. (34) found that spinal anaesthesia decreased the incidence of delirium in patients with a hip fracture. On the other hand, in a meta-analysis, it was reported that the type of anaesthesia was not influential with regard to the development of delirium, although postoperative cognitive function was impaired at an insignificantly higher rate in patients given general anaesthesia (35). In our study, the incidence of delirium was higher in patients who were administered regional anaesthesia. The rate of patients with ASA IV was 30.8% (for those receiving general anaesthesia) and the mean age was 70.4±15.2 years in patients having undergone regional anaesthesia administration (in patients given general anaesthesia, the values are 5.4% and 58.4±12.5, respectively). Of the patients, 22 underwent hip surgery. We think that the fact that our patients who were administered regional anaesthesia had important risk factors for delirium, such as a high ASA score, an age of 65 years and over and major orthopaedic surgery, contributed to these results.

Radtke et al. (36) reported that intraoperative remifentanil infusion decreased postoperative delirium incidence (36). In our study, no effect of intraoperative remifentanil infusion on postoperative delirium incidence was observed.

The frequency of delirium, which was between 10% and 40% in cancer patients, can rise up to 85% in terminal cancer patients. In a study in which postoperative delirium was investigated in geriatric patients who underwent elective surgery due to solid tumours, it was demonstrated that the magnitude of surgical procedures and preoperative cognitive functions were independent risk factors for delirium (37). In our study, 177 patients were underwent large surgical interventions under elective conditions for cancer. The incidence of delirium was found to be higher in patients with a malignancy diagnosis, but this was statistically in significant.

CAS is a scale that is preferred for the evaluation of delirium in intensive care units. It is easy to use, and its usability in major clinical studies has been demonstrated (38, 39). It is known that 64–84% of patients with delirium are unnoticed and that 33–66% are undiagnosed. However, 30–40% of delirium cases that develop in hospitals result from preventable causes (17, 40). In this study, we aimed to provide postoperative routine implementation of a delirium evaluation method, such as CAS, while determining the incidence of delirium in our postoperative surgical intensive care unit. We suggest that the diagnosis of delirium can be established with CAS, which is rapid and easy to use, especially for patients with risk factors in the postoperative period.

The inclusion of patients who were followed-up for the postoperative 24 h period in our study might have caused us to overlook patients with delirium that developed during the late postoperative period. However, approximately 5–10% of our patients were discharged from the surgical intensive care unit after a postoperative 48 h period. Therefore, we aimed to investigate the delirium incidence within the first 24 h and the factors affecting it.

Conclusion

We found that advanced age, high ASA score, preoperative DM and COPD presence were important risk factors for delirium. The regional anaesthesia method, high postoperative pain scores and meperidine use for postoperative pain treatment increase delirium incidence. The addition of CAS, which is a simple measurement technique, in the postoperative period to the daily follow-up forms may provide an early realization of delirium that may otherwise be frequently overlooked and can help to take precautions and set treatment. We are of the opinion that the preoperative, intraoperative and postoperative definitions and prevention of effective risk factors have primary importance for postoperative delirium.

Ethics Committee Approval: Ethics committee approval was received for this study from the ethics committee of Dr. Abdurrahman Yurtaslan Ankara Oncology Training and Research Hospital.

Informed Consent: Written informed consent was obtained from patients who participated in this study.

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